Exelon Nuclear

Exelon Generation
4300 Winfield Road
Warrenville, IL 60555

www.exeloncorp.com

10 CFR 50.4(b)(6)
10 CFR 50.71(e)

RS-02-181

October 22, 2002

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Zion Nuclear Power Station, Units 1 and 2
Facility Operating License Nos. DPR-39 and DPR-48
NRC Docket Nos. 50-295 and 50-304

Subject: Submittal of Defueled Safety Analysis Report Update

Reference: Commonwealth Edison Company letter, "Submittal of Defueled Safety Analysis Report Update," dated October 30, 2000

In accordance with the requirements of 10 CFR50.71, "Maintenance of records, making of reports," paragraph (e), we are submitting Revision 2 of the Defueled Safety Analysis Report (DSAR) for the Zion Nuclear Power Station (ZNPS), Units 1 and 2. In accordance with 10 CFR 50.71(e)(4), this DSAR update is being submitted within 24 months of the previous ZNPS DSAR revision which was submitted in the referenced letter. Accordingly, this revision is due to be submitted by October 30, 2002.

The changes to the DSAR reflect administrative changes (i.e., editorial and DSAR text changes) and plant design changes. Revision 2 includes changes made from October 4, 2000, through August 31, 2002.

Revision 2 of the ZNPS DSAR includes changes made under the provisions of 10 CFR 50.59, "Changes, tests, and experiments." We have evaluated the DSAR changes in accordance with 10 CFR 50.59 and concluded the changes did not require prior NRC approval in accordance with 10 CFR 50.59. Attachment 1 identifies the changes made under the provisions of 10 CFR 50.59, but not previously submitted to the NRC.

IE47

Attachment 2 contains the update to the ZNPS DSAR. As required by 10 CFR 50.71(e), Revision 2 consists of replacement pages to be inserted into Revision 1 of the DSAR. Page change instructions are provided. Changes to the DSAR are indicated by revision bars.

As Director – Licensing, I certify that the information in this submittal accurately presents changes made since the previous submittal necessary to reflect information and analyses submitted to the NRC or prepared in accordance with NRC requirements, and changes made under the provisions of 10 CFR 50.59, but not previously submitted to the NRC.

In accordance with 10 CFR 50.4, "Written communications," paragraph (b)(6), one signed original and ten copies of this update to the ZNPS DSAR are being provided to the NRC Document Control Desk and one copy to the NRC Region III office.

If you have any questions about this letter, please contact K. A. Ainger at (630) 657-2800.

Respectfully,

Keith R. Jury

Keith R. Jury
Director – Licensing
Mid-west Regional Operating Group

Attachments

cc: Regional Administrator – NRC Region III

ATTACHMENT 2

Zion Nuclear Power Station Defueled Safety Analysis Report Revision 2

To perform the October 2002 Zion Defueled Safety Analysis Report (DSAR) update please remove the existing pages and insert pages dated October 2002 as follows:

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1. INTRODUCTION AND GENERAL DESCRIPTION OF PLANT

1.1 INTRODUCTION

The Nuclear Regulatory Commission approved the transfer of the facility licenses from Commonwealth Edison (ComEd) Company to Exelon Generation Company, LLC (EGC) on August 3, 2000 (Reference 5). References in the Defueled Safety Analysis Report (DSAR) to ComEd, CECo, and Commonwealth Edison have been retained, as appropriate, instead of being changed to EGC to properly preserve the historical context.

In February 1998, ComEd certified the permanent cessation of operation of Zion Station Units 1 and 2 to the NRC (Reference 3). In March 1998, ComEd certified to the NRC that all fuel assemblies have been permanently removed from both Zion Station reactor vessels and placed in the spent fuel pool (Reference 4). Exelon Generation Company (EGC) plans to maintain Zion Station in the SAFSTOR condition (a period of safe storage of the stabilized and defueled facility) until final decommissioning and dismantlement.

This DSAR is derived from the July, 1996 update of the Zion Station Updated Final Safety Analysis Report (UFSAR). The DSAR has been developed as a licensing basis document that reflects the permanently defueled condition of Zion Station and supercedes the UFSAR. As such, the DSAR is intended to serve the same function during SAFSTOR and decommissioning that the UFSAR served during operation of the facility. An evaluation of the systems, structures and components (SSCs) described in the UFSAR was performed to determine the function, if any, these systems would perform in a defueled condition. Each major SSC was evaluated to determine if it was required to support the safe storage of irradiated fuel in the spent fuel pool, or needed to support decommissioning activities. The criteria used to evaluate the major SSCs and the conclusion of the evaluations are provided in Section 3 of the DSAR.

A brief history of major plant operations and licensing related actions for Zion Station is as follows:

1. Construction Permit issued, December 1968,
2. Final Safety Analysis Report submitted, December 1970,
3. Operating license issued, April 1973 for Unit 1 and November 1973 for Unit 2,
4. Commercial Operations achieved, December 1973 for Unit 1 and September 1974 for Unit 2,
5. Certification of permanent cessation of plant operation submitted, February 1998,
6. Certification of permanent removal of all fuel from the reactor vessels, March 1998.

Upon docketing of the certification for permanent cessation of operation and permanent removal of fuel from the reactor vessels, the 10 CFR Part 50 license no longer authorizes operation of the reactors or emplacement or retention of fuel in the reactor vessels. In addition, the operating licenses scheduled to expire in April 2013 for Unit 1 and November 2013 for Unit 2 continue to remain in effect until the Nuclear Regulatory Commission notifies EGC that the licenses have been terminated.

1.2.1.1 Overall Requirements

1. Quality and Performance Standards

Those features of the facility which are essential to the prevention of accidents which could affect the public health and safety or to the mitigation of their consequences are designed, fabricated, and erected to:

a. Quality standards that reflect the importance of the safety function to be performed. Recognized codes and standards are used when appropriate to the application.
b. Performance standards that will enable the facility to withstand, without loss of the capability to protect the public, the additional forces imposed by the most severe earthquakes, flooding conditions, winds, ice, or other natural phenomena characteristic of the Zion site.

Features of the facility essential to accident prevention and mitigation are the controls and cooling systems necessary to maintain the integrity of the fuel cladding, the power supplies and supporting services to these systems, and the components employed to safely convey and store radioactive wastes and spent reactor fuel.

Quality standards of material selection, design, fabrication, and inspection governing the above features conform to the applicable provisions of recognized codes and good nuclear construction practice. Visual structural weld inspections in accordance with guidelines prepared by the Nuclear Construction Issues Group, NCIG-01 Rev. 2 (5/7/85), titled "Visual Weld Acceptance Criteria for Structural Welding at Nuclear Power Plants," were implemented and used effective July 1, 1986. Vessels comply with the ASME Boiler and Pressure Vessel Code under the specific classification dictated by their use, or other appropriate Codes. The principles of this Code, or equivalent guidelines, are employed where the Code is not strictly applicable but where the safety function calls for an equivalent assurance of quality. In the same manner, piping conforms to the requirements of USA Standard Code for Pressure Piping (ASA B31.1-1955) and Nuclear Code Cases N-7 and N-10.

In the normal course of valve vendor quality control, periodic dimensional checks on a sampling or spot check basis were made. When errors in thickness were found, the output from the foundries have been checked and repairs have been made, as necessary. In addition to the above, those valves 2-1/2 inches and up were generally subjected to volumetric inspection by ultrasonic or radiographic means (or by both) and hydrostatically tested.

In the case of valves furnished under the NSSS contract, Westinghouse conducted periodic vendor inspections to verify that the vendor was indeed complying with the approved program and procedures. Commonwealth Edison audited Westinghouse to confirm this action sequence.

For valves purchased by Commonwealth Edison, audits and inspections of various vendors were conducted by Commonwealth Edison to verify that the vendors complied with the approved programs and procedures.

All of the above actions were performed in accordance with the Commonwealth Edison Company Quality Assurance Program.

No reliance has been placed on the ASME survey and inspection system for equipment. The majority of the Seismic Class I equipment was purchased before the ASME system was instituted.

Structural, equipment, and piping materials, in the Auxiliary Building have been selected for their compatibility with the expected normal and accident environments.

2. Fire Protection

Fire protection facilities are provided in accordance with the recognized guidelines of the National Fire Protection Association, Nuclear Electric Insurance Limited, and Underwriters Laboratory.

The Fire Protection Report outlines the basic design and operational features of the plant Fire Protection System.

3. Record Requirements

EGC or its authorized representatives and Westinghouse Electric Corporation have retained complete documentation of the design, fabrication, and construction of all essential plant components.

These records are available to verify the high quality and performance standards applicable to all essential plant components.

1.2.1.2 Radiation Controls

Monitoring potentially radioactive areas is accomplished in the Control Room from which most actions required to maintain the safe operational status of the plant are centered.

In addition to instrumentation and controls which are required to maintain plant variables within prescribed operating ranges, means are provided to monitor fuel and waste storage and handling areas and all potentially contaminated facility effluent discharge paths.

Monitoring and alarm instrumentation is provided for fuel and waste storage and handling areas to detect inadequate cooling and to detect excessive radiation levels. Radiation monitors are provided to maintain surveillance over the release of radioactive gases and liquids.

A controlled ventilation system removes gaseous radioactivity from the atmosphere of the fuel and waste storage and handling areas of the Auxiliary Building and discharges it to the atmosphere via the plant vent. Radiation monitors are in continuous service in these areas to actuate high-activity alarms in the Control Room, as described in Section 3.

1.2.1.3 Fuel and Waste Storage Systems

All fuel storage and waste handling facilities are contained and the facility design is such that accidental releases of radioactivity directly to the atmosphere will not exceed the limits of 10CFR100.

All operations with the spent fuel are conducted underwater (see section 3). This provides visual control of the operation at all times and also maintains low radiation levels. The borated water assures subcriticality at all times and also provides adequate cooling for the spent fuel. The spent fuel storage pool is supplied with a cooling system for the removal of the decay heat of the spent fuel. Racks are provided to accommodate the storage of 3012 fuel assemblies. The storage pool is filled with borated water. The spent fuel is stored in a vertical array with sufficient center-to-center distance between assemblies to assure a K effective of less than 0.95, even if unborated water is used to fill the pit, for fuel having a maximum loading of 57.4 grams U-235 per axial centimeter of fuel assembly length. The water level maintained in the pool will provide sufficient shielding to permit normal occupancy of the area by operating personnel. The spent fuel pool is also provided with systems to maintain water cleanliness and to indicate pool water level. Gamma radiation in the Auxiliary Building is monitored and a high level is annunciated in the Control Room.

Water removed from the pool must be pumped out as there are no gravity drains. Spillage or leakage of any liquids from waste handling facilities go to floor drains which flow to sumps.

Postulated accidents involving the release of radioactivity from the fuel and waste storage and handling facilities are shown in Chapter 5 to result in exposures well within the limits of 10CFR100.

The spent fuel storage pool is a reinforced concrete structure with a corrosion resistant liner. This structure is designed to withstand the anticipated earthquake loadings so that the liner will prevent leakage even in the event the reinforced concrete develops cracks. The transfer tube which connects the refueling canal and the spent fuel pool and forms part of the Reactor Containment is provided with a valve and a blind flange which effectively closes off the transfer tube.

1.2.1.4 Effluents

Gaseous, liquid, and solid waste disposal facilities are designed so that discharge of effluents and-offsite shipments shall be in accordance with applicable governmental regulations.

Process and discharge streams are appropriately monitored and safety features are incorporated to preclude releases more than the limits of 10CFR20.

The plant restricted area, as it is applied to the definitions in 10CFR20, is defined in Appendix F of the Offsite Dose Calculation Manual (ODCM). This area includes sections of shoreline. The area is owned and controlled by EGC; the control being required in 10CFR20.

EGC has no riparian ownership extending out into the lake.

Verification of annual exposures to persons in those portions of the lake which constitute the restricted area will be accomplished by station release records and the environmental monitoring program. The restricted area does include shoreline frontage. This shoreline will be controlled. The shoreline is monitored at both the northern and southern boundaries by on-site stations as shown on Figure 1-1.

Environmental conditions do not place any restrictions on the normal release of operational radioactive effluents to the atmosphere. Radioactive fluids entering the WD System are collected in analysis tanks until the course of subsequent treatment is determined.

All solid wastes are placed in suitable containers and stored onsite until shipment offsite for disposal.

Liquid wastes are processed to remove most of the radioactive material. The spent resins from the demineralizers and the filter cartridges are packaged and stored onsite until shipment offsite for disposal. The processed water, from which most of the radioactive material has been removed, is recycled for reuse within the plant or is discharged through a monitored line into the circulating water discharge.

1.2.2 Structures

The major structures include a separate and independent Containment for each reactor, a common Auxiliary Building with holdup tank vault, a common Fuel Handling Building, a common Turbine Building, a common Cribhouse, and a common Administration and Service Building. General layouts of the Reactor Containment, Auxiliary Building and interior components arrangements are shown in figures 1-1 through 1-16.

1.2.3 Waste Disposal System

The shared WD System provides all equipment necessary to collect, process, and prepare for disposal all radioactive liquid, gaseous, and solid wastes produced as a result of reactor operation and decommissioning activities.

After collection, liquid wastes are demineralized. The treated water from the demineralizers may be recycled for use in the plant or may be discharged via the circulating water discharge at concentrations well within the limits of 10CFR20. The spent demineralizer resins are drummed, dewatered and shipped from the site for ultimate disposal in an authorized location.

Gaseous waste discharge to the environment is controlled to keep the offsite dose well within the limits of 10CFR20.

1.4 DRAWINGS AND OTHER DETAILED INFORMATION

Table 1-1 lists DSAR figures that are controlled drawings.

1.5 REFERENCES, Section 1.0

1. Atomic Energy Commission, Proposed General Design Criteria, Federal Register, July 11, 1967.

2. Atomic Energy Commission, General Design Criteria, Federal Register, July 1971.

3. Letter from O. D. Kingsley, ComEd to U.S. NRC, dated February 13, 1998, Certification of Permanent Cessation of Plant Operation

4. Letter from O. D. Kingsley, ComEd to U.S. NRC, dated March 9, 1998, Certification of Permanent Removal of all Fuel from the Reactor Vessels

5. NRC letter "Braidwood, Byron, Dresden, LaSalle, Quad Cities and Zion – Orders Approving Transfer of Licenses from Commonwealth Edison Company to Exelon Generation Company, LLC, and Approving Conforming Amendments," dated August 3, 2000.

2. SITE CHARACTERISTICS

2.0 INTRODUCTION

This chapter summarizes information on the geological, seismological, hydrological, and meteorological characteristics of the site and vicinity, in conjunction with population distribution, land use, and site activities and controls. The purpose is to indicate how these site characteristics influenced plant design, operating criteria, and overall adequacy of the site for nuclear power operations. Much of this information is historical in nature. This information demonstrates, in complement with more detailed discussions provided in other chapters, the overall adequacy of the site for safely storing, monitoring, and handling of fuel, to safely handle radioactive waste, and to monitor all radiological effluent release paths.

2.1 GEOGRAPHY AND DEMOGRAPHY

2.1.1 Site Location and Description

The site is in Northeast Illinois on the west shore of Lake Michigan about 40 miles N of Chicago, Illinois, and about 42 miles S of Milwaukee, Wisconsin, as shown in Figure 2-1. The site is in the extreme eastern portion of the city of Zion, (Lake County) Illinois, on the west shore of Lake Michigan approximately 6 miles NNE of the center of the city of Waukegan, Illinois, and 8 miles south of the center of the city of Kenosha, Wisconsin. It is located at longitude 87 degrees 48.1 minutes W and latitude 42 degrees 26.8 minutes N.

The site comprises approximately 250 acres which is owned by EGC. The site is traversed from west to east by Shiloh Boulevard near the northern property boundary. Site maps covering details out to a 10 mile radius and in the Low Population Zone (LPZ) and Exclusion areas, are respectively shown in Figures 2-1 and 2-2. Figure 2-3 is an aerial photograph depicting the site boundaries and details of the site.

In addition to those roads which connect directly with the site, there is a network of primary and secondary highways and section line roads in the adjacent area which provide a variety of high capacity routes to and from the site and the immediate vicinity, as indicated on Figure 2-2. For example, in addition to Shiloh Boulevard, which extends approximately 2 miles west of the plant site, there are within 1-mile of the site three other highways or roads (Ill. Rt. 173, 29th Street, and Wadsworth Road) extending westerly and intersecting each of the principal north-south secondary highways located within four miles of the site, i.e., Sheridan Road, Lewis Avenue, Kenosha and Green Bay Roads (Ill. Rt. 131), and also U.S. Rt. 41, a four lane, highspeed, divided highway. In addition, Interstate 94, a limited access, four lane tollway, is situated approximately 6 miles west of Zion.

2.1.2 Exclusion Area Authority and Control

The site, consisting of approximately 250 acres owned solely by EGC, provides the requisite exclusion area. Reference Section 1.2.1.4 for discussion of the restricted area.

There are no residences on the site or within 2000 feet of the station structures.

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Criterion 5 - Records Requirements

Records of the design, fabrication, and construction of essential components of the plant shall be maintained by the reactor operator or under its control throughout the life of the reactor.

Answer

The applicant intends to maintain, either in its possession or under its control, a complete set of records of the design, fabrication, construction and testing of major Seismic Class I plant components throughout the life of plant. A quality assurance program has been employed and appropriate records have been and are being maintained directly by EGC or are under EGC's control.

III. Nuclear and Radiation Controls

Criterion 11 - Control Room

The facility shall be provided with a control room from which actions to maintain safe operational status of the plant can be controlled. Adequate radiation protection shall be provided to permit access, even under accident conditions, to equipment in the control room or other areas as necessary to shut down and maintain safe control of the facility without radiation exposures of personnel in excess of 10CFR20 limits. It shall be possible to shut the reactor down and maintain it in a safe condition if access to the control room is lost due to fire or other cause.

Answer

A common control room contains all controls and instrumentation that were necessary for operation of each unit's reactor, turbine generator, and auxiliary and emergency systems under normal or accident conditions.

The Control Room is designed and equipped to minimize the possibility of events which might preclude occupancy. In addition, provisions were made for bringing both units to and maintaining them in a hot shutdown condition for an extended period of time from locations outside the Control Room. Chapter 3 discusses the Control Room Ventilation System.

Criterion 12 - Instrumentation and Control Systems

Instrumentation and controls shall be provided as required to monitor and maintain variables within prescribed operating ranges.

Answer

Sufficient instrumentation and controls are provided for safe and efficient operation of the facility. Additional details on instrumentation and controls are included in sections relating to specific systems and components.

3.7.3.4 Interaction of Other Piping with Category I Piping

Protection against interactions between Seismic Class I and Seismic Class II piping systems and equipment has been provided by the following methods:

1. All Seismic Class I piping and equipment has been located in Seismic Class I structures.

The following procedure is employed in evaluating seismic stress, induced by Seismic Class II piping systems on Seismic Class I piping:

1. Isolate piping between Seismic Class I and Seismic Class II regions by placing two (2) seismic restraints in the plane of global directions.

2. Consider the inertial load of Seismic Class II piping as an integrated part of Seismic Class I piping for performing dynamic response spectra analysis.

3.9.4.4 Spent Fuel Pool Make-up Capability

Various equipment and components are available to provide make-up water to the spent fuel pool. Make-up to the spent fuel pool would normally be required to account for natural evaporation. Makeup sources include water from a Condensate Storage Tank via a Demineralized Water Flushing pump and the Fire Protection header via hoses. A boron mixing tank located near the Spent Fuel Pool is available to provide borated water makeup.

An additional source of water that is lost from the pool through normal evaporation is an off-site water supply that is passed through a water purification unit prior to discharge into the pool.

The spent fuel pool has been analyzed for loss of cooling (see Chapter 5). Sufficient time exists from the time cooling is lost and boiling occurs that compensatory measures can be taken, including supplying make-up water, to prevent fuel damage and off-site releases that exceed USEPA Protective Action Guidelines or 10CFR100 limits.

3.9.4.5 Design Features Important to the Defueled Condition

This system is associated with the storage of nuclear fuel and helps ensure adequate decay heat removal (cooling function) while maintaining exposures to plant personnel ALARA (cleanup function). Those portions of the Spent Fuel Cooling and Cleanup System which provide cooling and cleanup capability to the spent fuel pool are considered ITDC. These are as follows:

- Spent fuel pool pumps (as required)
- Spent Fuel Pool heat exchangers (as required)
- Spent Fuel Pool demineralizers (as required)
- Associated piping, valves, filters, skimmers, and strainers
- Spent Fuel Pool weir gate, including seal and nitrogen pressurization bottles if transfer canal is drained and weir gate is installed (this is being listed here rather than in section 3.9.2 since its failure, which is discussed in chapter 5, could lead to a loss of Spent Fuel Pool cooling).
- Municipal water supply makeup to the SFP
- Boron mixing tank for borated water makeup.

3.10.2.2 System Description

The six service water pumps are rated at 22,000 gpm at 210 feet TDH. The pumps are located in the Crib House and take their suction from the Crib House forebay which receives water from the lake through three, 13-foot steel intake lines. Two of the intake lines have 24-foot diameter bell-shaped inlets and are covered by a flat protective canopy. The third intake line receives water through an annular structure with 55 openings separated by as much as 96 feet. During the spring, summer, and fall months, a fishnet barrier is installed around the perimeter of the intake structure to meet the facilities' National Pollution Discharge Elimination System (NPDES) permit requirements and is removed in the winter months. It is extremely improbable that any single barge or ship on Lake Michigan could block all of the circulating water intake structure. Any two of the openings in the annular intake structure which supplies one 13-foot intake line, or a small fraction of one of the two 24-foot diameter bell-shaped inlets, each of which supply one 13-foot intake line, would be adequate to provide full service water flow for both Unit 1 and Unit 2. In the event that all three intake lines are blocked, water can be admitted to the forebay through one discharge line and its recirculation connection to the forebay.

The discharge of three service water pumps passes through two 40,000 gpm strainers with $^1/_8$-inch openings to a common header for all six pumps. The main supply headers connect to this common discharge header.

Service Water is taken from the discharge of the service water booster pumps, treated by an electrolytic dissolution of both copper and aluminum and returned to the Service Water system upstream of the Service Water pumps into the intake bays. The copper and aluminum will control the Zebra Mussel population by reducing their ability to attach to substrate and by inhibiting settlement of the Zebra larvae.

The normal water supply to the Fire Protection System and the Screen Wash System is provided by the service water booster pumps. These pumps take suction from each of the main headers in the Crib House. The main headers pass under the Turbine Building after leaving the Crib House and enter the Auxiliary Building where the cooling water loops are supplied.

Pushbuttons are installed at the 4-kV buses 147, 148, 149, 247, 248 and 249 for local start of the service water pumps.

3.11.2.2.1.6 Reliability of Power Supplies

Power to all ITDC related 4160 Vac and 480 Vac equipment is from the following sources:

1. a) A normal source from the system auxiliary transformer via buses 142, 143, 144, and 145 for Unit 1 and buses 242, 243, 244, and 245 for Unit 2. Buses 142, 143, and 144 normally supply buses 147, 148, and 149 respectively and buses 242, 243, and 244 normally supply buses 247, 248, and 249 respectively,

   b) 480-V SFNI switchgear buses 1 and 2 for spent fuel pool support systems.

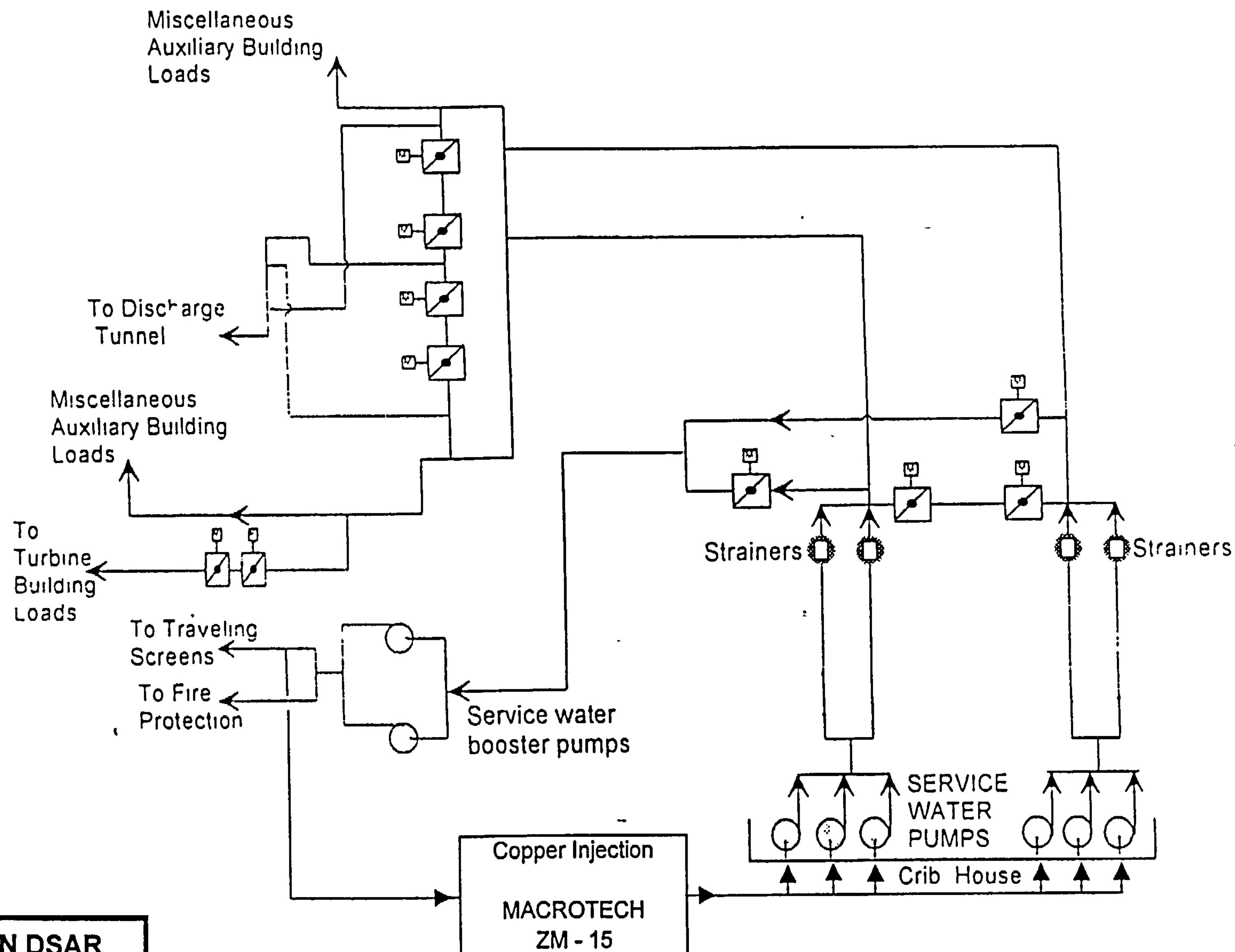
2. a) A reserve source of offsite generated power from the opposite unit's system auxiliary transformer via bus 241 for Unit 1 buses 147, 148, and 149 and bus 141 for Unit 2 buses 247, 248, and 249. Tie buses and manually controlled circuit breakers are permanently installed for this connection,

   b) A bus crosstie is provided between SFNI switchgear bus 1 and 2 to allow either bus to supply the spent fuel pool support systems.

3. a) An emergency hookup connection to allow for a temporary power supply to feed the SFNI buses.

Electrical interlocks consisting of mechanically actuated auxiliary breaker position switches associated with the reserve power source and standby power source feed circuit breakers are provided in the breaker close circuitry. These interlocks prevent an operator from closing both the reserve source and standby source feed breakers for each bus, which if not prevented, could result in paralleling the standby and reserve power sources.

No electrical or mechanical interlocks are available for the SFNI feed breakers. These breakers are controlled by operating procedures.



ZION STATION DSAR

Figure 3-40

SERVICE WATER SYSTEM (SIMPLIFIED)

October 2002

4. RADIATION PROTECTION

4.1 Ensuring That Occupational Radiation Exposures are As Low As Reasonably Achievable (ALARA)

Consistent with station modification, maintenance, operational requirements, and economic and social considerations, the policy of EGC is to:

1. Maintain the occupational dose equivalent to the individual As Low as is Reasonably Achievable (ALARA);

2. Maintain the sum of occupational dose equivalents received by all exposed workers ALARA; and

3. Limit the number of workers authorized to receive exposure to radiation.

Regulatory Guide 8.8, Revision 3, Sections C.1, C.3, and C.4 is used as a basis for developing the ALARA and radiation protection programs.

Station management's commitment to this policy is reflected in radiological procedures and programs. The Radiation Protection staff provides the radiological conditions and protective requirements necessary to complete work safely. Each individual's responsibility to adhere to these requirements and the procedures governing their work is key to the success of the program.

4.2 Radiation Sources

The source terms used in the design and evaluation of Zion Station consists of the types and quantities of radionuclides that are produced in the fuel, primary coolant, and structural materials of the reactor coolant system, and the rate of transfer of these nuclides into other systems for an operating plant. In a permanently defueled plant, the number and magnitude of potential radiation sources have been reduced substantially from the original design bases source terms. The source terms in the defueled condition are bounded by the source terms existing during normal plant operations and relate to stored spent fuel, residual post operational radioactive material, structure and component activation, and new radioactive material generated during plant decontamination. The source terms used in the original plant design are historical information and are not discussed here since they are not applicable for a permanently defueled plant. The radiation protection program will continue to monitor appropriate areas to ensure proper confinement of existing radioactive material.

4.3.1.1.2 Fuel Handling Building

The Fuel Handling Building houses the spent fuel pool and associated pumping, cooling, and filtering equipment and is considered ITDC. The spent fuel pool provides water shielding of approximately 25 feet over the stored spent fuel. The minimum wall thickness of the pool is 6 feet 0 inches of ordinary concrete.

Concrete shielding is provided for the following spent fuel pool service equipment:

Heat Exchangers
Pumps
Skimmer Filter
Demineralizer After Filter

4.4 Health Physics Program

4.4.1 Equipment, Instrumentation, and Facilities

4.4.1.1 Personnel Monitoring

All personnel entering radiologically posted areas onsite are required to wear personnel monitoring devices, except for visitors. The minimum requirements include an electronic dosimeter (or its equivalent) and a thermoluminescent dosimeter (TLD) badge. Additional dosimeters such as finger rings, electronic dosimeter, high range pocket dosimeter, neutron dosimeter, etc. are required when radiological conditions warrant their use. Visitors to the station who enter radiologically posted areas are required to either wear the minimum dosimetry described above, or they are provided with an escort who will wear an extra TLD badge to collectively monitor their dose. As a minimum, each visitor will wear an electronic dosimeter (or its equivalent) inside posted areas.

As a general rule, the TLD badge will provide the official record of personnel exposure. If this device is lost or fails to respond properly, the official record will be determined by a health physicist after evaluating electronic dosimeters, radiation surveys, radiation timekeeping records, etc. The electronic dosimeter readings (or equivalent) and applicable timekeeping results are normally recorded daily. These records are routinely reviewed by radiation protection management and, if applicable, by management in the individual's work group. The TLD badges are changed at regular intervals. Badge results are reviewed by Health Physics Management and are entered in the EGC computerized dose records system. These official and permanent records provide the exposure data for the administrative control of radiation exposure. Required exposure reports are made by radiation protection management utilizing the dose records system.

A portal personnel radiation monitor is provided at the plant exit for monitoring of surface and internal activity of people leaving the plant. The portal monitor provides for complete head-to-foot coverage. The portal console monitor located on the portal frame includes status lights including a contamination alarm. The contamination signal from the console alerts personnel to the contamination condition so that the proper action can be taken.

4.4.2 Procedures

The Radiation Protection Program and Procedures are designed to provide protection of personnel against exposure to radiation and radioactive materials in a manner consistent with applicable regulations. The policy of EGC is to maintain personnel radiation exposure As Low as is Reasonably Achievable (ALARA). Therefore, each individual is trained to minimize his exposure consistent with discharging his duties. Each individual is responsible for observing rules adopted for his safety and that of others.

Radiation protection personnel evaluate radiological conditions of operations and establish the procedures to be followed by all personnel. They ensure that all applicable regulations are complied with and that the required radiation protection records are adequately maintained.

Training of operators, maintenance, and technical personnel in radiation protection principles and procedures took place before initial unit operation. New employees, contractors, and other supporting personnel are given initial training at the beginning of their work assignments and annual retraining thereafter.

Procedures are in place which require performance of ALARA reviews, as necessary, of proposed plant design changes and modifications.

4.5 Radioactive Waste Management

4.5.1 General

Radioactive waste management is maintained through the use of the Liquid and Solid Waste Systems. These systems collect, process, monitor, and regulate the discharge of all potentially radioactive wastes from both units. Storage of radioactive gaseous waste for decay is not anticipated in the defueled condition. The contents of the six gas decay tanks have been sampled and determined to have negligible activity. As such, the Gaseous Waste System is not important to the defueled condition of the station and is not discussed as part of Radioactive Waste Management. The design of the waste systems is in accordance with USNRC Regulatory Guide 1.143.

Normally, all waste systems are operated remotely so as to minimize the radiation exposure of plant personnel. Waste processing is a batch-type operation which allows a determination of the activity to be discharged before any action is undertaken to make the actual release. Monitoring equipment is provided to maintain surveillance over the release operations and to halt these operations on indication of radioactivity concentrations above established limits.

The design of the waste systems was based on 1% of the fuel rods releasing fission products into the coolant by diffusion out of the pellets through defects in the cladding. In the defueled condition, the normal sources of radioactive wastes are activated corrosion products and fission products generated during power operations, liquid wastes generated while maintaining spent fuel pool water chemistry, liquid wastes generated during decommissioning activities, ground water in-leakage through contaminated areas in the auxiliary building, and solid wastes in the form of spent demineralizer resins, filters and sludge. Since neither of the Zion Station reactor cores operated with 1% failed fuel, the design of the Radioactive Waste Systems in the defueled condition is bounded by the original design of the system.

6. CONDUCT OF OPERATIONS

6.1 RESPONSIBILITY AND ORGANIZATION

Onsite and offsite organizations are established for unit and corporate management, respectively. The onsite and offsite organizations include the positions for activities affecting the safety of the facility.

1. Lines of authority, responsibility, and communication are established and defined for the highest management levels through intermediate levels including all operating organization positions. These relationships are documented and updated, as appropriate, in the form of organization charts, functional descriptions of departmental responsibilities and relationships, and job descriptions for key personnel positions, or in equivalent form of documentation.

2. The Regional Operating Group Vice President has corporate responsibility for decommissioning activities and the safe storage of spent nuclear fuel at the facility.

3. Zion Station is managed by the Decommissioning Plant Manager. The Decommissioning Plant Manager has day-to-day responsibility for the facility and has control of the onsite activities necessary for the safe operation and maintenance of structures and systems required for the safe storage of spent nuclear fuel.

4. The individuals who train the operating staff and those who carry out radiation protection and quality functions may report to an appropriate onsite manager; however, they have sufficient organizational freedom to ensure their independence from operating pressures.

6.1.1 On-Site Organization

6.1.1.1 Duties and Responsibilities of the Operating Staff Personnel

6.1.1.1.1 Decommissioning Operations Manager

The Decommissioning Operations Manager is responsible for the operation of dedicated systems for the facility. He directs and monitors the activities of decommissioning work groups to ensure that there is no adverse safety impact on the facility prior to execution. He is responsible for assuring that the facility technical specifications are met.

The DSEP is distributed on a controlled basis to all stations and emergency facilities requiring them, including appropriate Federal, State, and local agencies.

The DSEP has been submitted to and approved by the NRC. It is reviewed annually, and any changes or revisions that pertain to regulatory requirements are submitted to the NRC for approval.

6.5.2 Security Plan

A detailed Zion physical security plan, withheld from public disclosure pursuant to 2.790 of 10CFR2, has been made available to the NRC.

The Zion Station physical security plan conforms to the requirements of 10CFR73.55.

6.5.3 Fire Protection Program

The Zion Station Fire Protection Program describes how Zion Station complies with and meets the objectives of 10CFR50.48(f) and describes the fire detection and suppression systems. The Fire Protection Program includes provisions for periodic assessments to ensure that the Program is maintained and is appropriate throughout the various stages of facility decommissioning. A fire suppression water system consists of: a water source(s); pumps; and distribution piping with associated sectionalizing isolation valves. Such valves shall include yard hydrant valves, and the first valve upstream of the water flow alarm device on each sprinkler, hose standpipe or spray system riser.

6.5.4 Fitness for Duty

The EGC Fitness for Duty (FFD) Program meets the requirements and standards of 10CFR26.

6.5.5 Offsite Dose Calculation Manual

The Zion Station Offsite Dose Calculation Manual (ODCM) is defined by Technical Specifications to contain the methodology and parameters used in the calculation of off-site doses resulting from radioactive gaseous and liquid effluents, in the calculation of gaseous and liquid effluent monitoring Alarm/Trip Setpoints and in the conduct of the Environmental Radiological Monitoring Program. The ODCM shall also contain the Radioactive Effluent Control and Radiological Environmental Monitoring Programs and descriptions of the information that should be included in the Annual Radiological Environmental Operating and Annual Radioactive Effluent Release Reports.